830.38.001

PROJECT WORK PLAN
CORRECTIVE ACTION PLAN
KOYUKUK, ALASKA

June 1994

Alaska Department of Environmental Conservation
Northern Region Office
610 University Avenue
Fairbnaks, Alaska 99709

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PROJECT WORK PLAN

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KOYUKUK, ALASKA

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Developed For:

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Shannon & Wilson Project Number: X-0621-3

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1.0 PROJECT DESCRIPTION

1.1 Introduction

Shannon & Wilson, Inc. has prepared this Corrective Action Plan (CAP) for the village of Koyukuk, Alaska. This Work Plan will be utilized for implementation of corrective action activities. The scope of corrective action activities is based on Shannon & Wilson's recommendations presented in the Release Assessment Report dated May 1994 and the results of a Village Council meeting in Koyukuk attended by Mr. Benjamin Thomas of ADEC and Mr. Mark Lockwood of Shannon & Wilson on May 27, 1994. The recommendations which were accepted by the Alaska Department of Environmental Conservation (ADEC) and Village Council and described in this Work Plan include placement of a bentonite seal around the Village Safe Water well, covering the area north of the Koyukuk School with clean fill soils to reduce dermal exposure to contaminated surface soil, placing a new liner on the existing contaminated soil stockpile, and collecting soil samples from the contaminated soil pile after two years to evaluate levels of soil contamination.

Placing of the bentonite seal around the well and replacing the cover on the contaminated soil pile are scheduled to occur during the summer of 1994. Covering the area north of the school with clean fill material is tentatively scheduled for the summer of 1995 to allow fill material to be transported from the borrow source across the Yukon River during the winter of 1994/1995. Soil sampling at the contaminated soil pile is tentatively scheduled for the summer of 1996. This work will be performed under our term Cleanup Contract #18447191 with Alaska Department of Environmental Conservation.

1.2 Background

The village of Koyukuk is located at the confluence of the Koyukuk and Yukon Rivers (Figure 1). A detail of the Koyukuk school area including the location of soil borings drilled during the release investigation is shown in Figure 2. In May 1992 strong hydrocarbon odors were detected by the contractor during the excavation of soils for the proposed Koyukuk School addition in May, 1992. Shannon & Wilson was requested by the contractor to mobilize to Koyukuk to determine the extent of the impacted area. Based on personal communications with persons familiar with the operation of the fuel system and field observations, we understand that a fuel line, which connected the barge off-loading facility, the above ground fuel storage tanks, and the generator building, reportedly leaked small amounts at the fittings. It was also reported that the line was broken at least once, releasing 500 to 2,500 gallons of fuel. The line was rerouted to the south of the school building in preparation for the construction of the school addition. Foam insulation placed under the existing school building had apparently been degraded by the diesel fuel for several feet under the northern side of the school. Field screening results obtained with a photoionization detector (PID) and selected samples analyzed by thin layer chromatography (TLC) indicated the most highly impacted soil was located on the north side of the school in the area of the reported rupture(s) of the fuel line. TLC results in the area of the proposed addition on the north side of the school were 10,000 ppm diesel for samples collected 4 to 6 inches below the ground surface. Near surface soil screening along the former fuel line route northwest of the school indicated the presence of 50 to 350 ppm total organic vapors. A near surface (4 to 6 inches below the ground surface) soil sample was collected beneath the west side of the school 16 feet south of the northwest corner. PID readings were measured at less than 5 ppm total volatiles and TLC results indicated less than 50 ppm diesel.

In May 1992, Shannon & Wilson, Inc. was retained to monitor contaminated soil removal, collect soil samples from the limits of the excavation, coordinate containment cell construction, and supervise contaminated soil stockpiling operations at the site of the Koyukuk School addition. The objective of this work was to remove the hydrocarbon-impacted soil from an area

2 feet wider than the foam footprint of the addition on the north side of the school and excavate contaminated soil to the top of the permafrost layer (approximately 7.5 feet). The work resulted in the excavation of soil from an area 18 feet wide by 60 feet long along the north side of the school. In addition, an area 60 feet long by 3 feet wide beneath the north side of the existing school was excavated to a depth of 1 foot. The excavation depths were constrained by frozen soil. The excavated material was contained within a long-term storage cell west of the tank farm. Five soil samples were collected from the limits of the excavation and analyzed for diesel range organics (DRO) by EPA method 8100 Modified. The results ranged from 4,000 to 10,000 ppm DRO. A backhoe was utilized to dig trenches at selected locations outside of the excavation to assess the impacted area. A soil sample collected from a trench (approximately 3 to 4 feet deep) west of the excavation area was analyzed and reported to contain 2,600 ppm DRO. A soil sample collected from the base of a shallow trench (3.5 feet deep) east of the excavation area and south of the Village Safe Water Facility was analyzed and DRO was not reported above the laboratory detection limit.

Shannon & Wilson performed a release investigation at the site in December 1993 to evaluate the potential extent of soil contamination surrounding the school and in the vicinity of the Village Safe Water well such that remedial alternatives could be developed. The results of this work are presented in Shannon & Wilson's Release Assessment Report to ADEC dated May 1994. Recommendations presented in this report are the basis for this Work Plan.

1.3 Corrective Action Tasks

Based on the Release Assessment, the following Corrective Actions will be performed:

- Excavate soil from around the Village Safe Water well to the top of the permafrost boundary and place a bentonite seal around the well. Backfill the excavation with clean fill material similar to the surrounding soils. The excavated soil will be segregated, based on field screening results, into potentially clean and contaminated soil piles. These soil piles will be managed in accordance with this Work Plan. This work is scheduled to occur in the summer of 1994.

- Place a new cover over the existing stockpile and secure for long term use. Collect soil samples from the contaminated soil pile for laboratory analysis. Soil sampling procedures and analytical testing to be performed is described in this Work Plan. This work is scheduled to occur in the summer of 1994.

- Place 4 to 6 inches of clean fill material over the contaminated soil area north of the Koyukuk School. The area to be covered and placement of the fill material are described in this Work Plan. This work is scheduled to occur in the summer of 1995.

- Collect soil samples from the contaminated soil pile for laboratory analysis. Soil sampling procedures and analytical testing to be performed is described in this Work Plan. This work is tentatively scheduled for the summer of 1996.

- Prepare a progress report following each summer of corrective action activity. The reports will summarize the work completed during the respective summer, describe field methods used to complete the work, and present observations, conclusions, and/or recommendations, where appropriate. Summaries of analytical results will be included as appropriate.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

2.1 Project Organization

Shannon & Wilson, Inc. will be the prime contractor for the work to be conducted under this Work Plan. Commercial Testing & Engineering Company (CT&E) will be subcontracted to provide organic analytical services for the project and will receive the soil samples collected for the project. Other non-specified subcontractors are expected to be utilized in renting or leasing equipment for the project and transporting equipment and personnel to and from Koyukuk.

2.2 Management Personnel Responsibilities

Rohn D. Abbott, Principal, will provide technical guidance as needed and will review the final report.

David McDowell, Associate, will provide technical guidance to field personnel, as necessary. In addition, he has overseen the preparation of this work plan and will assist in the preparation of the final reports.

John Spielman, Hydrogeologist, will be the project manager and principal contact and has prepared these Work Plans. He will coordinate field activities, ensure adherence to the work plan, and be responsible for the preparation of the final reports.

Julie Bush, Sarah Hojem or Mark Lockwood, will be the site geologist implementing field activities. They will be responsible for adhering to the Work Plan and will document any deviations from it when changes are necessary or warranted based on actual conditions. In addition, they will be the Site Health & Safety Officer for the project.

Commercial Testing & Engineering Company, 5633 "B" Street, Anchorage, Alaska will be responsible for providing analytical data which complies with their in-house Quality Assurance Plan and which has been accepted by ADEC.

2.3 Subcontractors

Soil Services Inc. of Fairbanks will coordinate backhoe rental and will provide an operator for the backhoe.

The Village of Koyukuk will provide clean and unclassified fill. They will also provide heavy equipment (loader and dump truck) and operators. Laborers with proper health and safety training will also be provided by the Village.

3.0 WORK TASKS

3.1 Village Safe Water Well Seal

Soil excavation will occur around the Village Safe Water well using a backhoe or similar equipment. Prior to the start of excavation activities, a portion of the insulated corrugated metal pipe (CMP) surrounding the well casing above the ground surface may be dismantled, as necessary. Excavation of soil will proceed until the permafrost surface is encountered and a 3- to 4-foot radius around the well is established. Based on the depth of permafrost observed in Boring B-14 during drilling (10 feet), the depth of permafrost at the Village Safe Water well is estimated to be at least 10 feet below the ground surface. The size of the excavation will be constrained by the Village Safe Water building located about 10 to 15 feet from the well. Therefore, the excavation is anticipated to be relatively steep and will preclude personnel from entering the excavation.

Following the removal of soil to the top of the permafrost and within a 3 to 4-foot radius around the well, dry bentonite chips will be placed around the well casing and hydrated. The placement of bentonite chips and the hydration will occur in 8 to 12-inch lifts to obtain a minimum hydrated thickness of 3 feet of bentonite adjacent to the well. The upper surface of the bentonite will be sloped away from the well to divert seepage water away from the well casing. The hydrated bentonite will be allowed to cure and completely hydrate for a period of 12 hours following installation before backfill material is placed over the seal. Backfill material will consist of clean fill material with a similar grain-size distribution as the soils surrounding the excavation. Approximately 18 inches of fill will be placed over the bentonite as an initial lift. This lift will be compacted by tamping with the backhoe bucket. Successive lifts will be placed in the excavation and tamped with the backhoe bucket. A schematic cross-section of the excavation, bentonite seal, and backfill for this work task is presented in Figure 3.

Based on the analytical results of soil samples from soil boring, B-14, contaminated soil may be encountered during the excavation activities. The soil excavated from the area adjacent to the well will transported and placed in the existing contaminated soil stockpile.

3.2 Cover Replacement and Sampling of Existing Contaminated Soil Stockpile

The reinforced polyethylene sheeting cover on the existing soil pile will be removed and replaced with a 12 mil, petroleum-resistant, UV-protected liner. The old cover will remain in place. The new liner material will have dimensions of 50 by 150 feet and will be installed over the soil pile such that the cover membrane extends at least one foot over the crest of the perimeter containment berm. The cover liner will be secured by a combination of tie-downs, weights, and/or clean fill material placed over the edges of the liner. Cover replacement activities will be performed after the seal at the well has been completed and any contaminated soil excavated during that task has been added to the contaminated soil pile.

Soil samples will be collected from the contaminated soil stockpile to determine the concentration of diesel range petroleum hydrocarbons remaining in the soils. Sample collection and analysis plan is outlined in Section 4.1. If this initial sampling indicates that DRO concentration still exceeded the cleanup levels, an additional round of sampling will be conducted during the summer of 1996.

3.3 Placement of Fill Material Over Contaminated Soil Area

During the summer of 1995, 4 to 6 inches of fill material will be placed over the contaminated surface soils north of the school to reduce the potential for dermal contact. Fill soils will be obtained during the winter of 1994/1995 from a borrow source located across the Yukon River. The Village of Koyukuk will stockpile the clean fill adjacent to the area to be covered. Fill material will be spread over the area delineated in Figure 4. Based on an average thickness of 5 inches over the area indicated, approximately 100 cubic yards of material will be used. Transfer of the fill from the stockpile(s) to the spreading area will be performed by a front-end loader or similar equipment. Spreading of the fill over the contaminated area will be performed using a combination of front-end loader and manual shovel and raking. The front-end loader will be used to spread soil over the large, unrestricted areas. Manual spreading will be required within restricted areas or adjacent to buildings or structures. Following completion of the spreading and/or grading, a plate compactor or similar equipment will be used to compact the fill soils. Compaction will be used to stabilize the loose fill and create a surface suitable for current site use.

3.4 Stockpile Sampling

Depending on the results of the 1994 stockpile sampling, soil samples will be collected from the contaminated soil stockpile during the summer of 1996 to determine the concentration of diesel range petroleum hydrocarbons remaining in the soils. Sample collection and analysis plan is outlined in Section 4.1.

4.0 SAMPLING AND ANALYSIS PLAN

4.1 Soil Stockpile Sampling and Analysis

Field screening will be conducted within the soil treatment cell to evaluate the effectiveness of the treatment process. A screening grid will be established for at least 16 locations with a grid spacing of approximately 25 feet. The sample density is approximately 1 screening point per 20 cubic yards of soil, twice the required density. Field screening of the contaminated soils will be conducted with a PID along the intersecting grid points to delineate the soils with the highest potential hydrocarbon contamination. PID measurements will be conducted on samples collected with a hand auger from a depth of about 18 inches. If the results of the field screening indicates that the PID measurements are below the target action levels, the six grid points with the highest response from the PID will be sampled and the samples will be submitted to a chemical laboratory for analysis of DRO by EPA method 8100 modified.

4.2 Quality Assurance/Quality Control Samples

Quality Assurance/Quality Control (QA/QC) samples for this project will consist of the collection and analysis of field duplicate samples and laboratory QA/QC samples consisting of matrix spikes, matrix spike duplicates, and method blanks. Field duplicates are samples collected from the same location and submitted to the laboratory as a "blind" sample, to provide a check that the data generated by the project laboratory is of suitable quality. Field QA/QC samples will be collected at a frequency of at least 10 percent for the organic analyses. All field QA/QC samples will be labelled with unique sample numbers. Data quality objectives are presented in Section 5.

4.3 Sample Handling and Documentation

As each sample is collected, the sample container will be labelled with pertinent identifying information including project name, site designation, unique sample number, date, time, and personnel collecting the sample. This information will also be recorded in the field logbook as each sample is obtained. Samples will be placed immediately into a cooler with ice or ice substitute and maintained at approximately 4°C. Sample packaging and shipment will be conducted according to the following procedures:

1. About 3 inches of inert cushioning material, such as foam or bubble wrap, will be placed in the bottom of the cooler.

2. Samples will be wrapped in foam or bubble wrap and taped, placed in the cooler such that containers do not touch each other.

3. More packing material will be added around and on top of the sample bottles.

4. Chain-of-custody forms, and any other supporting paperwork, and pertinent field notes will be sealed in waterproof plastic bags and taped to the inside of the lid of the cooler.

5. Ice or ice substitute will be placed on top of the bottles and packing material. Additional empty space within the cooler will be filled with packing material.

6. The cooler will be sealed with tape.

7. Numbered and signed custody seals will be attached to the cooler in two places under wide, clear tape.

8. A completed shipping label will be attached to the top of the cooler.

9. QA/QC samples will be labeled and numbered so as not to reveal their identity to the analytical laboratory.

Chain-of-custody documentation will be completed for each sample shipment. The chain-of-custody form is designed to document the transfer of samples from the field to the laboratory. As such, the form is designed to summarize the contents of the shipment (number, size, and contents of containers), analysis parameters, the dates and times of any custody transfer, and signatures of all parties relinquishing and receiving the samples. Soil and water samples will be hand delivered to CTE's drop point.

5.0 QUALITY ASSURANCE PROJECT PLAN

Quality assurance (QA) and quality control (QC) are important components of an environmental site assessment. QA is defined as the total integrated program for assuring reliability of screening and measuring data. QC is the routine use of specific procedures which ensure that defined standards of sampling and analysis are met. The Quality Assurance Project Plan (QAPP) prepared for this project will define our data quality objectives, analytical sample containers, and holding times of the specific analyses to ensure that sampling, documentation, and laboratory data are effective and do not detract from the quality or reliability of the results.

Shannon & Wilson, Inc. uses QA/QC principles as guidance on all our projects. We have a QA/QC plan on file with the regional offices of ADEC. The key to the success of our QA/QC plan is our staff of qualified geologists, engineers, and drill crews who have hands-on experience with the stringent procedures necessary when drilling and sampling for trace levels of contaminants. Each professional staff member has seen the results of evaluation of his or her decontamination and sampling procedures and understands which methods produce meaningful and valid results. This is the goal of QA/QC.

6.0 SITE HEALTH & SAFETY PLAN

6.1 Personnel Training

Field personnel shall have training that meets the requirements of the Alaska Department of Labor for work at potential hazardous waste sites. Field personnel have completed a baseline medical examination and annual follow-up medical examinations.

6.2 Emergency Services

Limited medical services are available at the Koyukuk clinic near the project site. Additional medical services are available at Galena or Anchorage by air transport. The following area services can be contacted in case of emergencies.

Koyukuk Clinic	927-2221
Galena Clinic	1-656-1266
Fairbanks Memorial Hospital	1-452-8181
Air Ambulance, Humana Hospital- Anchorage	1-258-3822
Providence Hospital Emergency Dept.	1-261-3111
Shannon & Wilson office	479-0600

6.3 Hazards

Physical hazards which may be associated with the drilling and sampling activities include the following:

- The movement of heavy equipment such as backhoes and front-end loaders and other vehicles in the area is a potential hazard. All personnel will be aware of such vehicles in the work area.

- Tripping and falling over equipment is a potential hazard. All personnel should keep the ground surface in the work area as free of equipment as possible.

Chemical hazards include contact through breathing air or physical contact with contaminated soil.

Fuels - Diesel fuel or degraded fuel products may be encountered in the soil during corrective action activities. Although undiluted gasoline can cause skin reactions, no adverse effects are expected to result from handling these contaminants at the concentrations detected in soil samples to date. Gasoline is considered relatively volatile, evaporating rapidly when exposed to air. It has a vapor density of 3 to 4 (air = 1) which causes its vapors to concentrate in low lying areas. The lower explosive limit (LEL) is 1.4 percent or 14,000 parts per million (ppm).

The most toxic component in gasoline or diesel fuels is benzene, which is added to fuel products at a rate of up to 5 percent to increase the octane levels in unleaded gasoline. Benzene (and related compounds such as ethylbenzene and xylene isomers) have a characteristic "sweet" aroma. All are central nervous system depressants and have been linked with some types of cancer when workers have been exposed to a high (300 to 600 ppm) range for long periods of time (15 or more years). The OSHA permissible exposure limit (PEL) as found in 29 CFR 1910, subpart Z, is 1.0 ppm with a ceiling concentration of 5.0 ppm. NIOSH's recommended exposure limit is 0.1 ppm for 8 hour Time Weighted Average (TWA) or 1 ppm for 15 minute ceiling. The PEL for ethylbenzene, toluene and xylene isomers is 100.

6.4 Personal Protective Equipment

Personal protective equipment will be required during the course of the field explorations. Selection will be based primarily on site hazard assessment data and work task requirements. Field work will be conducted in Level D protection, unless field monitoring by the site health officer indicates otherwise.

- Level D Personal Protective Equipment - Personnel working shall wear as a minimum:

  Standard work clothes, cotton overalls, or disposable chemical resistant coverall (Tyvek).

  Protective gloves, hard hat, boots, and if necessary, hearing protection..

- Level C Personal Protective Equipment - When air monitoring indicates the potential for exposure to chemical vapors, personnel shall upgrade to Level C protection. Level C protection will include as a minimum:
  Half-face, air-purifying respirator, organic vapor cartridges, dust/mist pre-filters as necessary (NIOSH/MSHA Approved), Disposable chemical resistant coveralls (Tyvek), Neoprene rubber gloves, Overboots, or chemical resistant rubber boots, Goggles or safety glasses

6.5 Air Monitoring

Air monitoring for organic vapors in the breathing zone will be performed periodically by the on-site safety officer using the photoionization detector (PID). The breathing zone is defined from the knees to the top of the head. The level of Personal Protective Equipment (PPE) will be upgraded to Level C when organic vapor concentrations exceed 5 ppm continuously. The location and frequency of breathing zone air monitoring will based on site conditions encountered and on the levels detected. The following are actions to be taken for measured levels on the PID above background:

Level Above Background	Action
<2.5 ppm	Intermittent readings as deemed necessary
2.5 - 5 ppm	Continuous monitoring
5 - 25 ppm	Continuous monitoring Half-face respirator with OV cartridge
25 - 50 ppm	As above if less than 15 minutes continuous
>50 ppm	Evacuate site. Evaluate and/or upgrade to Level B.

6.6 General Site Safety Requirements

The following practices are expressly forbidden during operations on the site:

- Smoking, eating, or drinking while in the work zones or in any potentially contaminated area.
- Ignition of flammable/combustible materials in the work zone; equipment shall be bonded and grounded, spark-proof and explosion resistant, as appropriate. A minimum of one fire extinguisher will be present at the site during work activities.
- Contact with potentially contaminated surface. Walking through puddles or pools of liquid, kneeling on the ground or leaning, sitting or placing equipment on contaminated soil should be avoided.

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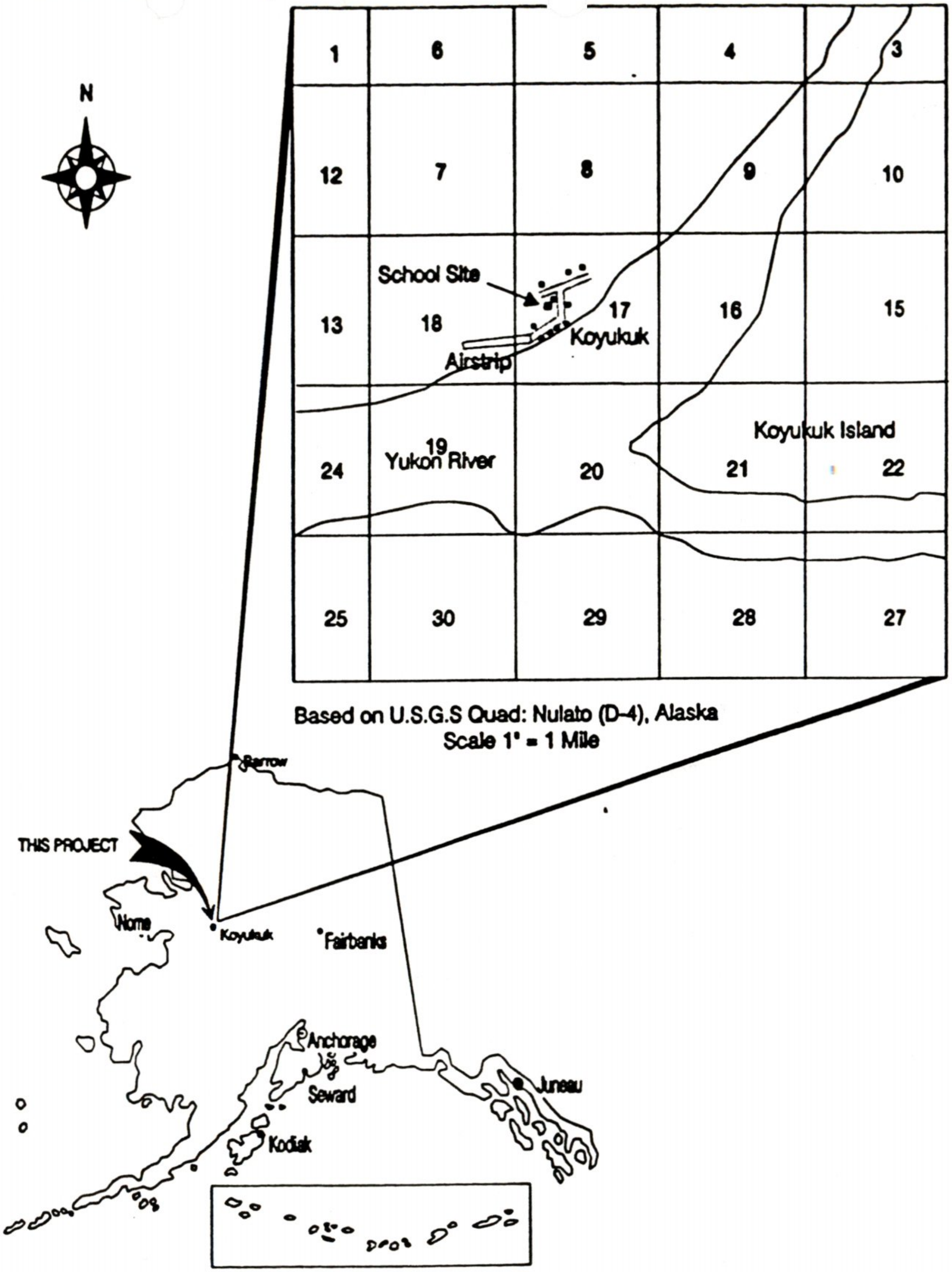
7.0 ESTIMATED PROJECT COSTS

The estimated costs of the tasks outlined in this work plan are presented below. A detailed breakdown of estimated costs is presented in Appendix A. The cost associated with Task 1 include rental and transport costs associated with moving a backhoe by barge to Koyukuk. Due to possible barge delays, an additional two weeks of rental costs are included in the estimate as a contingency.

The cost estimate for Task 4 and 5 includes an additional 5% for anticipated inflation. The cost estimate for Task 6 and 7 include an additional 10 % for anticipated inflation.

7.1 Task Specific Cost Breakdown

Task 1.	Village Safe Water Well Seal (1994)	$16,076.27
Task 2.	Cover Replacement and Sampling of Existing Stockpile (1994)	$4,074.05
Task 3.	Reporting (Task 1 and 2, 1994)	$3,190.54
Task 4.	Placement of Cover Fill Over Contaminated Soil Area	$7,100.90
Task 5.	Reporting (Task 4, 1995)	$3,207.91
Task 6.	Contaminated Stockpile Sampling (1996)	$6,158.47
Task 7.	Reporting (Task 6, 1996)	$3,360.67
	TOTAL	$43,168.80



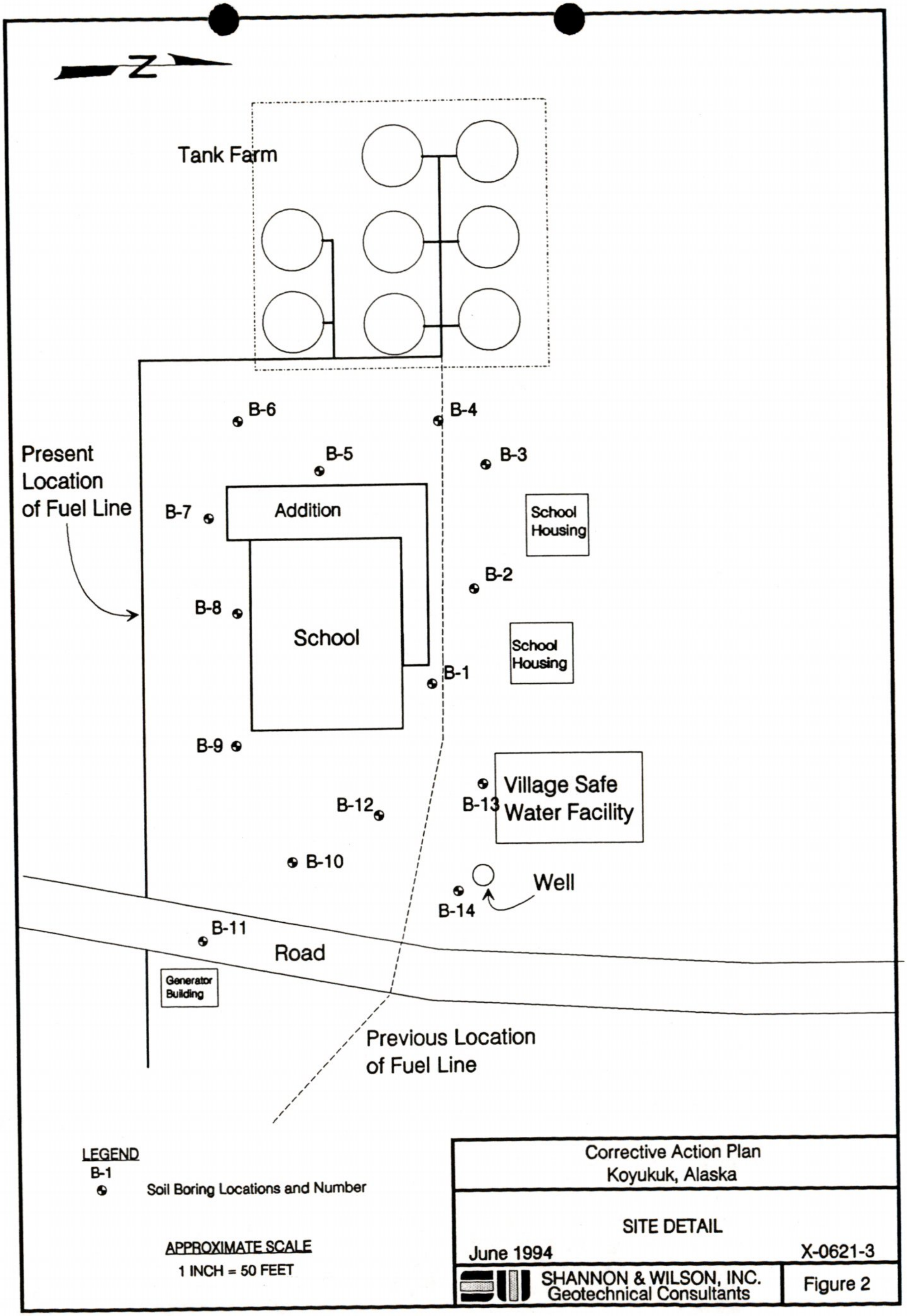
Corrective Action Plan
Koyukuk, Alaska

LOCATION PLAN

June 1994 X-0621-3

SHANNON & WILSON, INC.
Geotechnical Consultants

Figure 1


N
Tank Farm
B-6
B-4
B-5
B-3
Present Location of Fuel Line
B-7
Addition
School Housing
B-2
B-8
School
School Housing
B-1
B-9
Village Safe Water Facility
B-12
B-13
B-10
Well
B-14
B-11
Road
Generator Building
Previous Location of Fuel Line
LEGEND
B-1
Soil Boring Locations and Number
APPROXIMATE SCALE
1 INCH = 50 FEET
Corrective Action Plan
Koyukuk, Alaska
SITE DETAIL
June 1994
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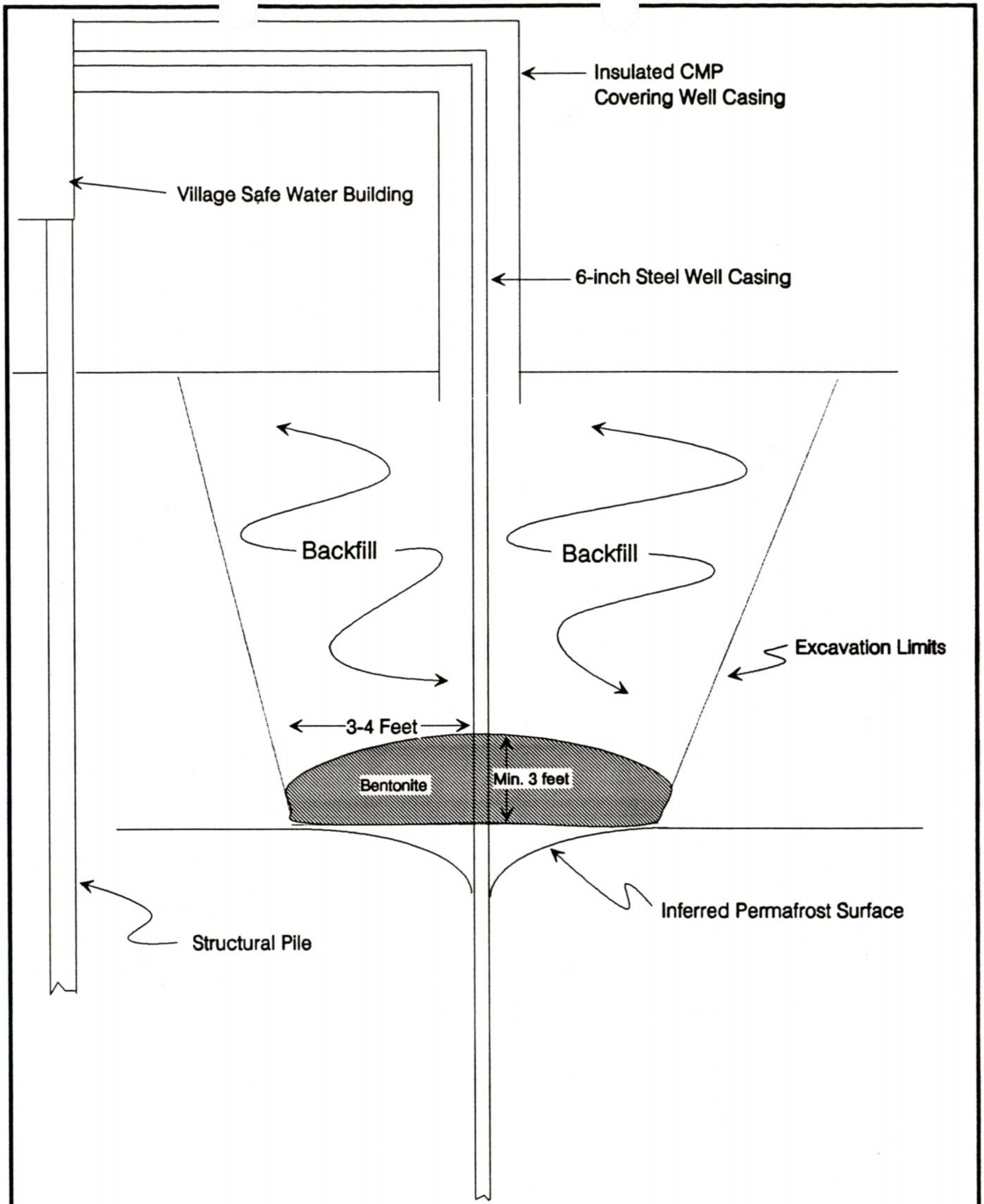
SHANNON & WILSON, INC.
Geotechnical Consultants
Figure 2



Not To Scale

Corrective Action Plan
Koyukuk, Alaska

SCHEMATIC CROSS-SECTION OF
WELL SEAL EXCAVATION

June 1994

X-0621-3

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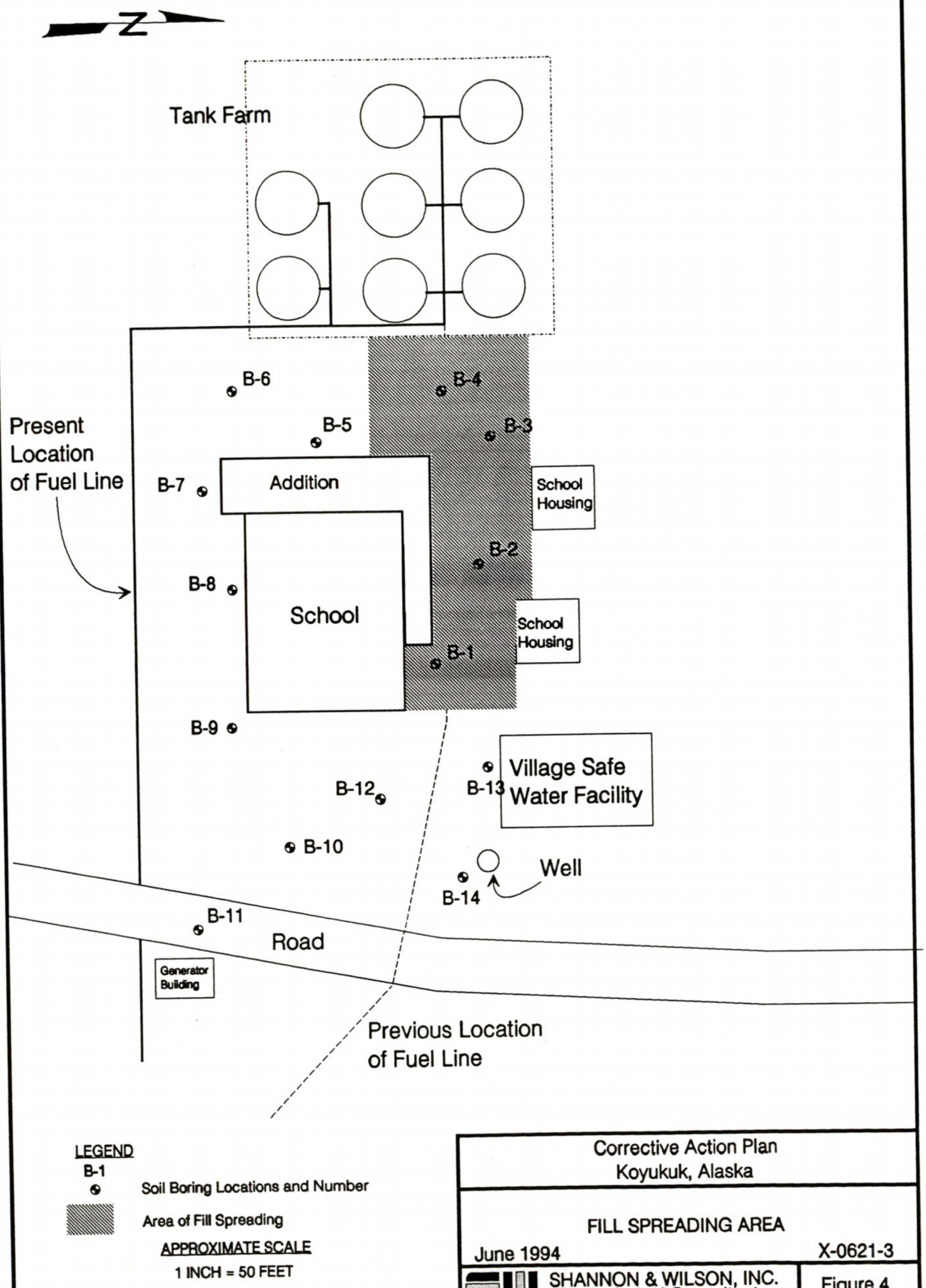
Figure 3



Corrective Action Plan
Koyukuk, Alaska

FILL SPREADING AREA

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Figure 4